

ABSTRACT

A system for determining a biologic constituent including hematocrit transcutaneously, noninvasively and continuously. A finger clip assembly includes including at least a pair of emitters and a photodiode in appropriate alignment to enable operation in either a transmissive mode or a reflectance mode. At least one predetermined wavelength of light is passed onto or through body tissues such as a finger, earlobe, or scalp, etc. and attenuation of light at that wavelength is detected. Likewise, the change in blood flow is determined by various techniques including optical, pressure, piezo and strain gage methods. Mathematical manipulation of the detected values compensates for the effects of body tissue and fluid and determines the hematocrit value. If an additional wavelength of light is used which attenuates light substantially differently by oxyhemoglobin and reduced hemoglobin, then the blood oxygen saturation value, independent of hematocrit may be determined. Further, if an additional wavelength of light is used which greatly attenuates light due to bilirubin (440 nm) or glucose (1060 nm), then the bilirubin or glucose value may also be determined. Also how to determine the hematocrit with a two step DC analysis technique is provided. Then a pulse wave is not required, so this method may be utilized in states of low blood pressure or low blood flow.